

A NEW SPECIES OF *POLYPODIUM* (POLYPODIACEAE) AND TWO NEW SPECIES OF *HYPOLEPIS* (DENNSTAEDTIACEAE) FROM MESOAMERICA

The following new species are here described as a result of my work on the pteridophyte volume for the Flora Mesoamericana project.

***Polypodium alansmithii* R. C. Moran, sp. nov.**

TYPE: Mexico. Chiapas: 22 km from San Cristóbal de las Casas on the road to Tenejapa, then right 3 km on the road to Matzam, 2,400 m, Hust *et al.* 2173 (holotype, MO; isotype, UC not seen). Figure 1.

Rhizoma 2–4 mm latum latissime repens, squamis 2–4 mm longis bicoloribus linear-lanceolatis adpressis; petiolis laminas circa aequantibus atrobrunneis; laminis (7–)10–18(–22) × 4.5–15 cm deltatis lanceolatis vel oblongis pinnatisectis vel pinnatis in parte basale; pinnis 3–6(–8) mm latis integris vel raro crenatis, 8–16 utroque rhachidis latere.

Epiphytic, rarely epipetric or terrestrial; rhizome 2–4 mm wide, long-creeping, the scales 2–4 mm, lanceolate, bicolorous, black medially with pale brown margins, clathrate or subclathrate medially, appressed, denticulate to erose; petiole ca. equaling the lamina, dark brown, nonalate; lamina (7–)10–18(–22) × 4.5–15 cm, broadly deltate to broadly oblong, pinnatisect, sparsely scaly on both surfaces, the scales usually circular or ovate, occasionally with an acicular apex, subentire to denticulate; pinnae 2.5–8 × 0.3–0.6(–0.8) cm, pairs 8–16, entire to crenate, the distal ones ascending; veins free, obscure; sori round, not embossed adaxially.

Selected specimens examined. MEXICO. CHIAPAS: 11 mi. W of San Cristóbal Las Casas, along Hwy. 190, 2,350 m, Croat 40499 (MO). OAXACA: along Hwy. 175 through Sierra de Juárez, 36.9 mi. S of bridge at Valle Nacional, ca. 0.5 mi. E of the Summit, 2,750 m, Croat 48161 (MO); Dtto. de Mixe, Mpio. de Tontontepec, ca. 1 km N of road between Ayutla and Totontepec on turnoff to Villa Alta, 2,560 m, Gereau *et al.* 2098 (MO). GUATEMALA. BAJA VERAPAZ: along dirt road 4 mi. NE of Purulhá, 1,500 m, Croat 41287 (MO). TOTONICAPÁN: cloud forest of María Tecún, Molina R. *et al.* 30394 (MO). HONDURAS. COPÁN: Quebrada La Honduras, 2 km NE de Santa Rosa

de Copán, 1,000 m, Mejía 43 (MO). FRANCISCO MORAZÁN: along road to Parque Nacional La Tigra, 22–25 km NE of Tegucigalpa, 1,850–2,125 m, Croat & Hannon 63996 (MO); above Rosario Mine, San Juancito Mts., 1,800 m, Morton 7417 (MO); La Tigra, 1,600 m, Regina A. 32 (MO). INTIBUCÁ: Cerro San Cristóbal, La Esperanza, 2,000 m, Mejía O. 100 (MO). EL SALVADOR. SANTA ANA: Cerro Verde, 1,900 m, Siu s.n. (MO). SONSONATE: Cerro Verde cloud forest, 2,000 m, Seiler 1474 (MO). NICARAGUA. ESTELÍ: Cumbre del Cerro Quiabú, 7 km W de Estelí, 1,600 m, Neill 1225 (MO). MADRIZ: Cerro Pataste, ca. 20 km SW de Ciudad Somoto, 1,700 m, Grijalva 913 (MO). JINOTEGA: along Hwy. 3, ca. 1 km NW of La Fundadora entrance, unnamed peak ca. 500 m W of hwy., 1,450–1,520 m, Stevens 20369 (MO); carretera Matagalpa-Jinotega, La Fundadora, 1,400 m, Moreno 1865 (MO). MATAGALPA: El Arenal, 500 m sigiendo el camino de Aranjuez, 1,400 m, Moreno 9590 (MO); Fuente Pura, km 142, carretera Matagalpa-Jinotega, 1,400–1,450 m, Moreno 16997 (MO).

This species is named for Alan R. Smith (UC), who has given me much help and encouragement with the Flora Mesoamericana project. The species occurs from southern Mexico (Guerrero, Oaxaca, and Chiapas) to Nicaragua, from 1,500 to 3,600 m. In the Floras of the region, it has previously been included in *P. montigenum*, which is closely related but differs by the characteristics given in the following key:

1. Lamina (12–)22–35(–50) × (4–)14–18 cm, 1-pinnate throughout; pinnae 7–15 mm wide, pairs 11–21, the distal ones perpendicular to the rachis or nearly so; petiole ½–¾ the length of the lamina; Costa Rica, Panama
..... *Polypondium montigenum*
- 1a. Lamina (7–)10–18(–22) × 4.5–15 cm, pinnatisect throughout or 1-pinnate basally; pinnae 3–6(–8) mm wide, pairs 8–16, the distal ones ascending; petiole ca. equaling the length of the lamina; southern Mexico to Nicaragua
..... *Polypondium alansmithii*

Since most of the distinguishing characteristics deal with leaf size and dissection, it could be argued that *Polypondium alansmithii* is merely a smaller, less-cut version of *P. montigenum*. The two com-



pletely differ in range, however, which supports their separation. Actually, *P. montigenum* is most closely related to *P. plebeium* Schldl. & Cham., which occurs from Mexico to Panama. *Polypodium montigenum* differs from *P. plebeium* only by its appressed, rather than spreading, rhizome scales.

Polypodium montigenum is redescribed below with a list of specimens examined because it has been too broadly circumscribed in the past. It is endemic to the mountains of Costa Rica and Panama, where it grows in cloud forests from 1,800 to 3,100 m.

Polypodium montigenum Maxon, Publ. Field Mus. Nat. Hist., Bot. Ser. 17: 306. 1938.
TYPE: Costa Rica. Heredia: along the cart road from Vara Blanca (between Poás and Barba volcanoes) to La Concordia, 1,600–1,950 m, Maxon & Harvey 8479 (holotype, US; isotype, NY not seen). Figure 2.

Epiphytic on tree trunks or clambering on surrounding vegetation; rhizome 3–6 mm wide, long-creeping, the scales 2–5 mm, linear-lanceolate, bicolorous, black or dark brown medially with narrow whitish margins, not clathrate medially, appressed, fimbriate to erose; petioles $\frac{1}{2}$ – $\frac{3}{4}$ as long as the lamina, dark brown, nonalate; lamina (12–) 22–35(–50) × (4–)14–18 cm, lanceolate to narrowly oblong, 1-pinnate throughout, sparsely scaly abaxially, the scales circular to ovate, sometimes with an acicular apex, ciliate; pinnae (2.5–)7–10 × (0.3–)0.7–1.5 cm, pairs 11–21, entire or crenate or (in large leaves) serrate, the distal ones perpendicular to the rachis or nearly so; veins free, obscure or rarely visible; sori round, not embossed adaxially.

Additional specimens examined. COSTA RICA. ALAJUELA: Angel Falls on road to Puerto Viejo, 5 km N of Vara Blanca, Mickel 3575 (NY, UC). CARTAGO-SAN JOSÉ: Interamerican Hwy., vic. of Villa Mills and 1 km NW (vic. of Hotel La Georgina), 2,800–2,900 m, Mickel 2181 (NY). CARTAGO: SE slope of Cerro de la Muerte, Cordillera de Talamanca, disturbed primary forest along Interamerican Hwy. 2,700 m, 23 May 1976, Croat 35402 (MO). HEREDIA: SW, W, and N slopes of Volcán Barva, along road from Sacramento to Colonia Jesús María, 2,650–2,810 m, Grayum 7484 (MO, NY, UC); Finca La Georgina y Vara Blanca, 1,950 m, Jiménez 2074 (NY); Cerro Chompipe, N de San Rafael, 2,000 m, Lems

6402829 (NY); 1 km W of Vara Blanca on the slope of Volcán Poás, 1,800 m, Mickel 2501 (NY); Vara Blanca de Sarapiquí, N slope of Central Cordillera, between Poás and Barva volcanoes, 1,800 m, Skutch 3513 (MO, NY). SAN JOSÉ: road from Cartago to San Isidro del General (Pan American Hwy., Rt. 2), between km 72 and 73, or 21–22 km SE of El Empalme, cloud forest, 2,750 m, A. R. Smith & Béliz 1998 (MO, UC); along Interamerican Hwy., Cerro de la Muerte, 3,100 m, Hennipman et al. 7124 (MO); S of Cartago, ca. 4 km S of El Empalme near La Chonta, 2,500 m, Lellinger 1580 (MO). PANAMA. CHIRIQUÍ: Guadalupe-Cerro Punta, Finca J. L. Caballero, 1 km de la carretera principal, 2,000 m, Caballero 95 (MO); Las Nubes, 5.5 km NW of Río Chiriquí Viejo, W of Cerro Punta, 2,200 m, Busey 672 (MO); Distrito Bugaba, Cerro Punta, 8°52'N, 82°33'E, cloud forest, 2,200 m, van der Werff & Herrera 6273 (MO, UC).

The labels on several specimens (e.g., Smith & Béliz 1998) state that the rhizome is scandent on surrounding vegetation, not clinging to trees. As far as I know, this growth habit has not been previously recorded in *Polypodium*. Other labels, however, state that the plants were growing as epiphytes on tree trunks.

Hypolepis trichobacilliformis R. C. Moran, sp. nov. TYPE: Panama. Chiriquí: along trail between N fork of Río Palo Alto and Cerro Pate Macho, ca. 6 km NE of Boquete, 8°48'N, 82°23.5'W, 1,600–2,000 m, 6 Feb. 1986, A. R. Smith et al. 2361 (holotype, MO; isotype, UC). Figure 3d–f.

Petiolus brunneus vel pallide brunneus spinosus; laminae utrinque pubescentes, pilis bacilliformibus plerumque adpressis pallide rubellis, margine glabris; indusiis viridibus saepe absentibus.

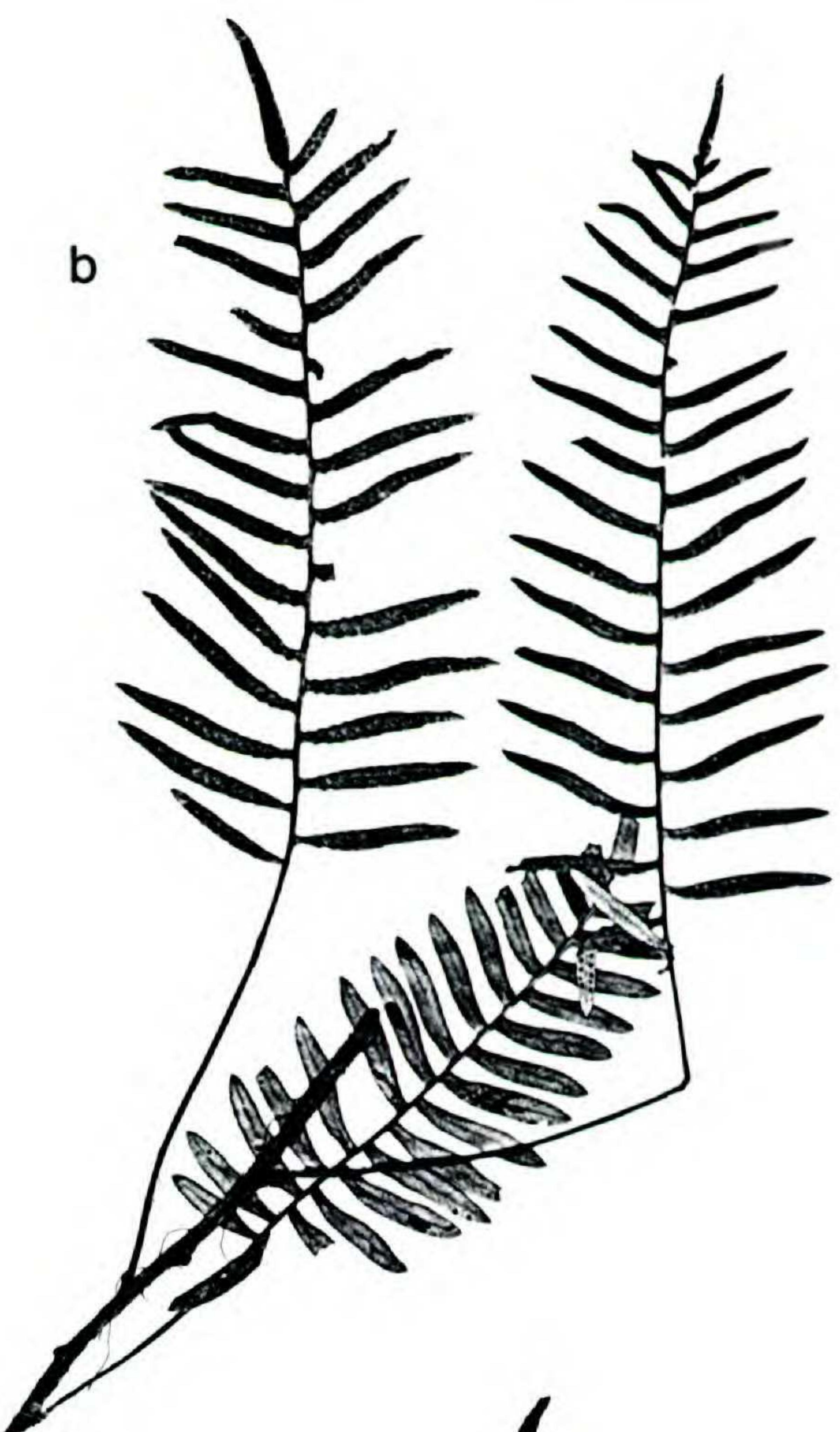
Leaves to ca. 1.5 m(?), continuous in growth, erect; petiole brown throughout or stramineous distally, epipetiolar branches present laterally near the base, usually 1–2; both surfaces of the lamina moderately pubescent along and between the veins with minute, mostly appressed, pale reddish, bacilliform hairs, lacking catenate hairs; lamina margins eciliate; costae of the penultimate segments not bordered adaxially by perpendicular, decurrent, herbaceous wings; rachis not spiny, brown to stramineous, straight (not flexuose) basally, glabrous; veins not ending in shallow emarginations; indusia ca. 0.1 mm wide, eciliate, green like the lamina or slightly scarious, not or only scarcely



FIGURE 1. Fertile leaves of *Polypodium alansmithii*.—a. Honduras, Mindence 31 (MO).—b. El Salvador, Seiler 1474 (MO).—c. Honduras, Espinal 55 (MO).—d. Guatemala, Molina R. et al. 30394 (MO).—e. Honduras, Mejia O. 100 (MO).—f. Honduras, Clare 203 (MO).—g. Honduras, Crúz P. 73 (MO).



15 cm






FIGURE 3. *Hypolepis ditrichomatis* (a-c) and *H. trichobacilliformis* (d-f).—a. Abaxial surface of tertiary segment.—b. Side view of acicular hyaline hairs between veins (left) and appressed reddish hairs along veins (right).—c. Basal portion of pinna.—d. Abaxial surface of tertiary segment.—e. Pinna bases.—f. Bacilliform hairs. a-c, van der Werff & Herrera 6265 (MO). d, Smith et al. 2361 (MO). e, f, van der Werff & Herrera 6472 (UC).

FIGURE 2. Fertile leaves of *Polypodium montigenum*.—a. Costa Rica, Hennipman et al. 7124 (MO).—b. (Holotype) Costa Rica, Maxon & Harvey 8497 (US).—c. Costa Rica, Lellinger 1580 (MO).—d. Panama, van der Werff & Herrera 6273 (MO).

reflexed and apparently absent, or fully reflexed but covering only $\frac{1}{4}$ – $\frac{1}{2}$ of the sorus.

Additional specimens examined. COSTA RICA. ALAJUELA: Volcán Poás, Stork 2507 (UC); Achioite, Volcán Poás, 2,200 m, Tonduz 10696 (US). CARTAGO: Santa Clara de Cartago, 1,950 m, Maxon & Harvey 8229 (US); Roble, massif de l'Irazu, 2,000 m, Pittier 4173 (US). HEREDIA: Vara Blanca de Sarapiquí, N slope of Central Cordillera, between Poás and Barba volcanoes, 1,615 m, Skutch 3600 (US). SAN JOSÉ: Cerro Chirripó, SW slopes along ridge trail from Canaan to summit, ca. 2,500 m, Evans et al. 55 (US); Cerro de la Muerte, 1 km NW of Villa Mills on Interamerican Hwy., Hotel La Georgina, 2,900 m, Lellinger 861 (US); Cerro de la Muerte, km 173 along the Interamerican Hwy., 2,600 m, Mickel 3300 (US); Las Nubes, 1,500–1,900 m, Standley 38807 (US); near Finca La Cima, above Los Lotes, N of El Copey, 2,100–2,400 m, Standley 42695a (US); on Pan American Hwy. above La Georgina, slopes of Cerro de la Muerte, 3,000 m, Stone 2015 (DUKE). CARTAGO/SAN JOSÉ: ca. 3 km SE of Trinidad or 42 km SE of San Isidro de Cartago along the Carretera Interamericana, 2,600 m, Wilbur 27801 (DUKE). PROVINCE UNKNOWN: San Geronimo, 1,500 m, Wercklé 581 (US). PANAMA. CHIRIQUÍ: Distrito Bugaba, Cerro Punta, along ridge to watershed to Bocas del Toro, 8°52'N, 82°33'E, 2,200 m, van der Werff & Herrera 6472 (MO, UC). CHIRIQUÍ/BOCAS DEL TORO: trail along the continental divide to ca. 3 km E of Cerro Pate Macho, cloud forest, 2,000–3,000 m, Smith et al. 2442 (UC); trailside in Quebrada Bajo Grande ca. 2 mi. E of Cerro Punta, 2,300 m, Wilbur et al. 13146 (DUKE).

This species grows in cloud forests, wet forests, clearings, and pastures from 1,600 to 2,200 m. It differs from all other *Hypolepis* in Mesoamerica by having short, cylindrical, bacilliform hairs on the lamina and medial sori that are not or only slightly protected by reflexed indusia. The density of the bacilliform hairs may vary from sparse to moderate, even on the same leaf. Larger catenate hairs, which occur on the abaxial surface in all other species of *Hypolepis* in Mesoamerica, are lacking in this species.

The indusia of *H. trichobacilliformis* are not or only slightly reflexed and texturally modified. In those cases where the indusia are fully reflexed, they cover $\frac{1}{4}$ – $\frac{1}{2}$ of the sorus. Because the sori are naked or only partially covered, some specimens of this species have been named as *H. nuda* Mett. ex Kuhn, a species endemic to the Andes of Venezuela. *Hypolepis nuda* differs by its marginal sori that tend to be elongated, short-stalked pinnae, and oval or semicircular segments.

***Hypolepis ditrichomatis* R. C. Moran, sp. nov.**

TYPE: Panama. Chiriquí: vicinity of Guadalupe, between Río Chiriquí Viejo and the continental divide, 8°53'N, 82°36'W, 2,200 m, Churchill & de Nevers 5048 (holotype, MO—3 sheets). Figure 3a–c.

Petiolus brunneus vel pallide brunneus; laminae utrinque pubescentes, pilis erectis acicularibus hyalinis secus et inter venus praesentibus et pilis (fere) adpressis gracilibus pallide rubris solum secus venas praesentibus praeditae; margine ciliatae.

Leaves to ca. 2 m, continuous in growth, scandent; petiole brown to tan, spiny, sparsely pubescent to glabrescent; both surfaces of the lamina sparsely to moderately pubescent along and between the veins with two kinds of hair, the first erect, acicular, hyaline, and found throughout, the second appressed or nearly so, slender, pale reddish, and found only on the veins and costae; lamina margin eciliate; costae of the penultimate segments not bordered adaxially by a perpendicular herbaceous wing; rachis spiny, brown, tan, or stramineous, straight or only slightly flexuose basally, sparsely pubescent to glabrescent; veins not ending in shallow emarginations; indusia 0.2–0.3 mm wide, scarious, eciliate.

Additional specimens examined. COSTA RICA. ALAJUELA: slope of Volcán Poás at bridge just below Hacienda El Tirol, 2,000 m, Mickel 2000 (UC). CARTAGO: Tapantí, ca. 15 km S of Paraíso, 1,150 m, Mickel 2306 (US); along Interamerican Hwy. between Cartago and San Isidro de El General, Scamman 7028 (GH, US, UC). HEREDIA: Vara Blanca, between Poás and Barba volcanoes, 1,600–1,700 m, Maxon & Harvey 8303 (US); steep pastured slopes of Volcán Barba, ca. 4 km from Vara Blanca on the N slopes, 1,750 m, Wilbur & Stone 10085 (DUKE, US). SAN JOSÉ: 25 km N of San Isidro de El General along the Interamerican Hwy., 1,800 m, Burger & Liesner 7038 (F, GH); slopes of Cordillera Talamanca, near La División N of San Isidro de El General, 2,400–2,900 m, Williams et al. 24425a (F). PANAMA. CHIRIQUÍ: upper Caldera Watershed, above El Boquete, 1,650–1,925 m, Maxon 5658 (US); Disto. Bugaba, Cerro Punta, cloud forest, 2,200 m, van der Werff & Herrera 6260 (MO, UC), 6265 (GH, MO, UC, US); Guadalupe, Cerro Punta, finca Maduro, 2,000 m, Caballero 120 (F, MO, PMA); Cerro Colorado, along road to copper mine 34.1 km beyond bridge over Río San Felix near town of San Felix, 13.1 km beyond turnoff to Escopeta, 1,390 m, Croat 37306 (MO).

This species grows in cloud forests from 1,200 to 2,900 m. It can be distinguished from all other *Hypolepis* in Mesoamerica by the two kinds of hairs on the lamina (see description). The slender, pale reddish hairs along the axes and veins are similar to those in *H. parallelogramma* Kunze, a South American species. That species, however, lacks the short, erect, hyaline, acicular hairs found on *H. ditrichomatis* and has a different cutting of the lamina.

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